

Docket No. 520.43429X00
Serial No. 10/765,920
Office Action dated April 10, 2006

REMARKS

I. Introduction

By the present Amendment, claims 1, 2, 14-16, 20, and 21 have been amended. No claims have been added or canceled. Accordingly, claims 1-21 remain pending in the application. Claims 1, 2, 14-16, 20, and 21 are independent.

II. Office Action Summary

In the Office Action of April 10, 2006, claims 1-21 were rejected under 35 USC §103(a) as being unpatentable over U.S. Patent Application 2002/0067477 to Morita et al. ("Morita") in view of U.S. Patent 6,621,571 issued to Maeda et al. ("Maeda"). This rejection is respectfully traversed.

III. Rejections under 35 USC §103

In rejecting the claims, the Office Action alleges that Morita discloses a pattern defect inspection apparatus that includes an illumination optical system having a laser light source for emitting ultraviolet laser light. The Office Action also indicates that a shutter is provided for selectively restricting passage of the ultraviolet light emitted from the laser light source, and that the shutter is opened to allow passage of UV laser light and closed after the reflected light image has been imaged by the detector. A quantity-of-light adjusting unit is provided for adjusting a quantity of the ultraviolet laser light emitted from the laser light source and an illumination range forming unit for forming an illumination range of the ultraviolet laser light whose quantity has been adjusted. The Office Action admits, however, that Morita does not expressly disclose the presence of a recipe setting unit. Maeda is relied upon for teaching this particular feature. Applicants contend that, as amended, the

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presently pending claims recite features that are not shown or suggested by art of record.

As amended, independent claim 1 defines a pattern defect inspection apparatus that comprises:

- a recipe setting unit for setting an inspection recipe and/or a review recipe;

- an illumination optical system including:

- a laser light source for emitting ultraviolet laser light;

- a shutter for selectively restricting passage of the ultraviolet laser light emitted from the laser light source;

- a quantity-of-light adjusting unit for adjusting a quantity of the ultraviolet laser light emitted from the laser light source in accordance with the inspection recipe and/or the review recipe set by the recipe setting unit;

- an illumination range forming unit for forming on a sample an illumination range of the ultraviolet laser light whose quantity has been adjusted by the quantity-of-light adjusting unit;

- a coherence reducing system for reducing coherence of the ultraviolet laser light received within the illumination range that has been formed by the illumination range forming unit; and

- an irradiation optical system for irradiating the sample with a ultraviolet light flux whose coherence has been reduced by the coherence reducing system; and

- a detection optical system including:

- a condensing optical system for condensing light reflected from the sample;

- a diffracted-light control optical system for controlling diffracted light of the reflected light that has been condensed by the condensing optical system; and

- a detecting unit for imaging a reflected light image coming from the sample to detect an image signal, said reflected light image being obtained through the diffracted-light control optical system;

- wherein the shutter opens when part of an area of the sample to be inspected is in a viewing field of the detection optical system and closes when the area to be inspected is out of the viewing field.

According to various features of independent claim 1, the pattern defect inspection apparatus includes a recipe setting unit that sets and/or reviews various

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inspection recipes. The inspection apparatus also includes an illumination optical system that has, in part, a laser light source, a shutter, and a quantity of light adjusting unit. The laser light source is used to emit ultraviolet laser light. The shutter is positioned such that it is capable of selectively restricting and facilitating passage of the ultraviolet laser light emitted from the laser light source. The quantity-of-light adjusting unit is used to adjust the amount of ultraviolet laser light emitted from the laser light source in accordance with the appropriate inspection and/or review recipe that has been set by the recipe setting unit. The pattern defect inspection apparatus also includes a detection optical system that has a condensing optical system, a defracted light control optical system, and a detecting unit. The condensing optical system condenses light that is reflected from the sample and the defracted light control optical system controls defracted light of the reflected light that has been condenses. Further, the detecting unit is used to image the reflected light image coming from the sample in order to detect an image signal. Furthermore, the illumination optical system is configured such that the shutter opens when part of an area of the sample that is to be inspected is within a viewing field of the detection optical system. The shutter subsequently closes when the area to be inspected is out of the viewing field.

At least one benefit achieved by the invention defined by independent claim 1, is the ability to prevent damage to the sample by ultraviolet radiation unless the portion of the sample being inspected is appropriately positioned. For example, as soon as the sample stage reaches an ending position of the pattern, the shutter and optical deflector are completely closed so that the sample is not irradiated with the ultraviolet light source. See page 57, lines 24 – page 58, line 3. Thus, rather than simply controlling the light source and the amount of light being irradiated, the entire

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shutter is controlled so that no light passes through. See Fig. 30 and corresponding description.

The Office Action alleges that Morita discloses the features recited in independent claim 1. As amended, however, there are various features that are not shown or suggested by the art of record. Specifically, the art of record does not provide an illumination optical system capable of completely closing or opening the shutter as set forth in independent claim 1. Morita appears to provide an ability to control irradiation of the sample. However, this differs from what is recited in the claimed invention. Specifically, Morita attempts to control the shutter when the amount of radiation reaches an upper bound value, or radiation threshold, which would cause the resist pattern to be shrunk by observing the integrated amount of the UV laser light radiation. Further, Morita controls opening and shutting of the shutter in the illumination optical system synchronously with the shutter of the imaging element. See paragraph [0062] and [0063]. Morita does not appear to provide any disclosure or suggestion for features recited in independent claim 1 such as:

wherein the shutter opens when part of an area of the sample to be inspected is in a viewing field of the detection optical system and closes when the area to be inspected is out of the viewing field.

It is therefore respectfully submitted that independent claim 1 is allowable over the art of record.

Claims 3-13 depend, either directly or indirectly, from independent claim 1, and are therefore believed allowable for at least the reasons set forth above with respect to independent claim 1. In addition, these claims each introduce novel elements that independently render them patentable over the art of record.

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Independent claim 2 defines a pattern defect inspection apparatus that includes limitations similar to those recited in independent claim 1. For example, the shutter of independent claim 2 also functions to open when part of the area of the sample to be inspected is in a viewing field of the detection optical system, and closes when the area to be inspected is out of the viewing field.

As previously discussed with respect to independent claim 1, this particular feature is not shown or suggested by the art of record.

It is therefore respectfully submitted that independent claim 2 is allowable over the art of record.

Independent claims 15, 16, and 20 each define a pattern inspection method. Each of these claims recites steps that are similar to some of the features recited in independent claim 1. For example, the shutter is opened when part of an area of the sample to be inspected is within a viewing field of the detection optical system, and closed when the area to be inspected is out of the viewing field. As previously discussed, the art of record does not appear to provide any disclosure or suggestion for controlling the shutter in such a manner.

It is therefore respectfully submitted that independent claims 15, 16, and 20 are allowable over the art of record.

Claims 17-19 depend from independent claim 15, and are therefore believed allowable for at least the reasons set forth above with respect to independent claim 15. In addition, these claims each introduce novel elements that independently render them patentable over the art of record.

Independent claims 14 and 21 each define a pattern inspection apparatus that comprises, in part:

wherein the shutter opens when part of an area of the sample to be inspected is in a viewing field of the detection optical system and closes when the area to be inspected is out of the viewing field.

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As previously discussed with respect to independent claim 1, this particular feature is not shown or suggested by the art of record.

It is therefore respectfully submitted that independent claims 14 and 21 are allowable over the art of record.

IV. Conclusion

For the reasons stated above, it is respectfully submitted that all of the pending claims are now in condition for allowance. Therefore, the issuance of a Notice of Allowance is believed in order, and courteously solicited.

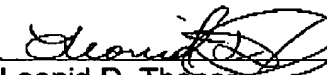
If the Examiner believes that there are any matters which can be resolved by way of either a personal or telephone interview, the Examiner is invited to contact Applicants' undersigned attorney at the number indicated below.

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AUTHORIZATION

Applicants request any shortage or excess in fees in connection with the filing of this paper, including extension of time fees, and for which no other form of payment is offered, be charged or credited to Deposit Account No. 01-2135 (Case: 520.43429X00).

Respectfully submitted,
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